201-14300

NCIC HPV
Sent by: Jodi Burgess

02/14/2003 02:30 PM

To: NCIC HPV
cc:
cc:
Subject: Submittal of Robust Summaries and HPV Test Plan for CAS No. 10595 -60-5

----- Forwarded by Nguyet Phan/DC/USEPA/US on 02/14/03 06:38 AM -----

"Barter, Jim" <barter@ppg.com> on 02/13/2003 03:37:55 PM

To: Rtk Chem/DC/USEPA/US@EPA, "'oppt.ncic@epa.gov'" <oppt.ncic@epamail.epa.gov>
cc:

Subject: Submittal of Robust Summaries and HPV Test Plan for CAS No. 10595 -60-5

<<...OLE_Obj...>>

PPG Industries, Inc. One PPG Place Pittsburgh, Pennsylvania 15272

James A. Barter, Ph.D.
Director, Environmental Health Sciences & Toxicology
Environment, Health & Safety

Phone: 412-434-2801
Fax: 412-434-3193
E-mail: barter@ppg.com

February 13, 2003

Christine Todd Whitman, Administrator
US Environmental Protection Agency
P.O. Box 1473
Merrifield, VA 22116

E-mail: chem.rtk@epa.gov; oppt.ncic@epa.gov

Attention: Chemicals Right-to Know Program
RE: Submittal of Information for the HPV Program
Submittal of Robust Summaries and Revised Test Plan for CAS No. 10595-60-5

Dear Ms. Whitman:

PPG Industries, Inc. and Air Products and Chemicals are resubmitting the Test Plan and Robust Summaries for Diethylenetriamine, 1,7-bis-(1,3-dimethylbutylidene) (CAS No. 10595-60-5) due to revisions we made in the Test Plan. Please post the resubmitted Test Plan and Robust Summaries

on the EPA HPV website.

We understand that there will be a 120-day review period for the Test Plan and that all comments received by EPA will be forwarded to PPG.

Please send an electronic acknowledgement of receipt of these documents to James Barter at barter@ppg.com.

If you have any questions, please do not hesitate to contact me.

Yours truly,
<<...OLE_Obj...>>

James A. Barter, Ph.D.
Director, Environmental Health Sciences & Toxicology

<<RobustSummaries CAS10595-60-5.RTF>> <<HPV Testplan CAS10595-60-5.doc>>


RobustSummaries CAS10595-60-5.RTF


HPV Testplan CAS10595-60-5.doc

201-14300A

Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene)

CAS No. 10595-60-5

U. S. EPA HPV Challenge Program Submission

January 2003

Submitted by

Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501

And
PPG Industries, Inc
One PPG Place
Pittsburgh, PA 15272

TEST PLAN

Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene)
CAS No. 10595-60-5

HPV End Point	Information Available (Yes/No)	Acceptable (Yes/No)	Surrogate Data (Yes/No)	Testing Required (Yes/No)
Physical-chemical Data				
Melting Point	No			No
Boiling Point	No			No
Vapor Pressure	Yes	Yes		No
Water Solubility	No		Yes	No
Partition Coefficient	Yes	Yes		No
Environmental Fate and Pathway				
Photodegradation	Yes	Yes		No
Stability in Water	Yes	Yes		No
Transport/distribution (Fugacity)	Yes	Yes		No
Biodegradation	No		Yes	No
Ecotoxicity				
Acute toxicity to fish	No		Yes	No
Acute toxicity to *daphnia*	No		Yes	No
Acute toxicity to algae	No		Yes	No
Toxicity				
Acute Toxicity	Yes	Yes		No
Repeated Dose Toxicity	No		Yes	No
Toxicity to Reproduction/Developmental toxicity	No		Yes	No
Genetic toxicity *in vitro* (Gene Mutation)	No		Yes	No
Genetic toxicity *in vitro* (Chromosomal Aberration)	No		Yes	No

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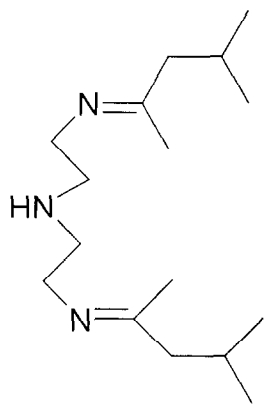
1. Sponsoring Companies

Air Products and Chemicals, Inc. and PPG Industries, Inc. are the manufacturers of Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) and are the joint sponsors of this substance for the U.S. Environmental Protection Agency's HPV Chemical Challenge Program. The technical contact is

Dr. James Barter
PPG Industries, Inc.
One PPG Place
Pittsburgh, Pennsylvania 15272
Phone (412) 434-2801

2. Test substance

Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) is a single chemical substance. The major use is for the production of paint products. Its molecular structure is as follows:



The test substance is produced in the presence of excess Methyl Isobutyl Ketone (MIBK) (~30%). At this concentration, the material is a clear, light yellow, very fluid liquid. An attempt was made to drive off the MIBK by distillation when the test substance was prepared for HPV testing. However, this attempted removal of the excess MIBK solvent from the substance resulted in formation of polymeric by-products. Therefore, the production batch (70% test substance in 30% MIBK) was used for testing.

3. Criteria for Determining Adequacy of Data

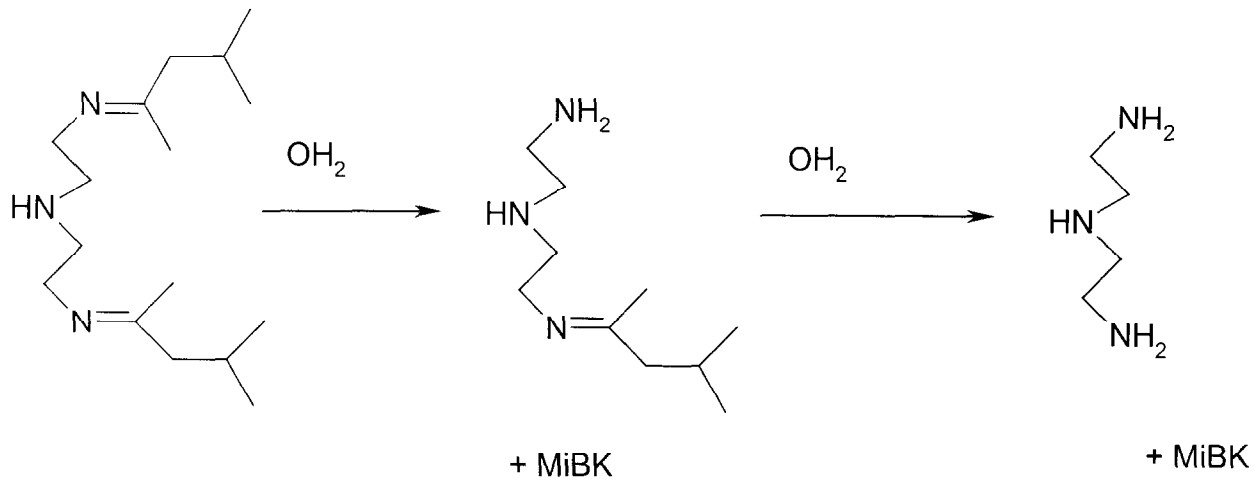
All relevant studies were reviewed and assessed for adequacy according to the standards of Klimisch *et al.* (1977). Four reliability categories, 1-reliable without restriction, 2-reliable with restriction, 3-not reliable, and 4-not assignable, have been established and a rating of 1 and 2 were considered to be adequate.

4. Test Plan

4.1 Physical/Chemical Properties

No data are available for melting point, boiling point, and water solubility. Because producing pure material (free of MIBK) for the purposes of determining a melting point and a boiling point is not possible, no meaningful data for melting and boiling points can be generated. In addition, the substance will probably begin to decompose before it boils, especially at atmospheric pressure. Therefore, no testing for these endpoints is recommended.

The test substance, Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) is rapidly hydrolyzed to Diethylenetriamine (DETA) and MIBK within minutes (*see section below for the details*).



If the quantity of the test substance added to water is high enough, the MIBK that is produced will exceed its solubility (1.9%) in water and a separate phase of MIBK will result. Due to the rapid hydrolysis, the water solubility of this material is expected to be limited to the solubility of DETA. Therefore, the water solubility of the test substance should be referenced to the DETA data. Both MIBK and DETA are listed under the EPA HPV Challenge Program and these chemicals are being handled under the Organization for Economic Cooperation and Development (OECD) HPV Screening Information Data Set (SIDS) Program. Data for vapor pressure and partition coefficient (Kow) are estimated (calculated) using a modeled approach. No testing is recommended.

4.2 Environmental Fate/Pathways

Results of the two hydrolysis studies indicate that the test substance is rapidly hydrolyzed to DETA (CAS number 111-40-0) and MIBK (CAS number 108-10-1). The calculated half-life in the first study (Springborn report, 2002) ranges from 1.31 minutes to 34.5 minutes depending on the pH of the test solutions.

Hydrolytic rate constant and % Hydrolysis

pH	Rate Constant (Kobs)	Calculate Half –Life ($t_{1/2}$)
1.2	1.44	28.9 minutes
4	1.21	34.5 minutes
7	11.5	3.61 minutes
9	0.53	1.31 minutes

In the second hydrolysis study (PPG Industries Analytical Report, 2002), greater than 90% of the test substance hydrolyzed within 5 minutes at all pH conditions.

Determination of Rate of Hydrolysis in different pH buffered conditions

Time (minutes)	pH 1	pH 4	pH 7	pH 9	Distilled Water
5	93.2%	94.5%	92.8%	87.9%	82.9%
15	94%	99%	98.9%	88.4%	90.8%
30	96.9%	99.7%	99.2%	92.7%	98.3%
60	98%	99.8%	100%	95.7%	100%

Since the test substance is produced in the presence of excess MIBK, which is used as a reflux solvent to assist in the removal of the product water via azeotropic distillation, only the presence of the one degradant DETA was confirmed in both studies.

Data for photodegradation and environmental transport are estimated using the EPIWIN/AOPWIN program. The estimated photodegradation hydroxyl radical rate constant is estimated to be 95.2679 E-12 cm^3/molecule-sec with a half-life calculated to be 0.112 days. Level III fugacity modeling indicates that the test substance should partition to water (3.59%), air (0.078%), soil (27.3%), and sediment (69%). No data on biodegradability is available. However, due to the rapid hydrolysis of the test substance into DETA and MIBK in water, the biodegradability of DETA and MIBK can be referenced for this end point. No testing is recommended.

4.3 Ecotoxicity

This end point is filled from DETA and MIBK data. Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) is rapidly hydrolyzed (in minutes) to DETA and MIBK. Due to the rapid hydrolysis, the ecotoxicity of this material is expected to result from the hydrolysis products, DETA and MIBK. The ecotoxicity of this test substance should be referenced to the ecotoxicity data from DETA and MIBK. No testing is recommended.

4.4 Human Health Data

4.4.1 Acute Mammalian Toxicity

This endpoint is filled by one oral toxicity study in rats and one dermal toxicity study in rabbits (Carnegie Mellon Institute of Research Report, 1981). The oral LD_{50} for Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) was 1.9 ml/kg and the dermal LD_{50} value was >2.0 ml/kg. In addition, due to the rapid changes of the test substance into DETA and MIBK in acidic conditions, the acute oral toxicity data from DETA and MIBK can be referenced for this end point. The oral LD_{50} of DETA and MIBK is reported as 1080 mg/kg and 2090 mg/kg, respectively in RTECS (Registry of Toxic Effects of Chemical Substances). No testing is recommended.

4.4.2 Repeated Dose Mammalian Toxicity

Due to the rapid hydrolysis of this test substance into DETA and MIBK under acidic conditions, the mammalian oral toxicity is expected to result from the hydrolysis products, DETA and MIBK. This end point should be referenced to the repeated dose mammalian toxicity study on DETA and MIBK. No testing is recommended.

4.4.3 Genetic Toxicity

Due to the rapid hydrolysis of this test substance into DETA and MIBK, the genetic toxicity is expected to result from the hydrolysis products, DETA and MIBK. Both MIBK and DETA are not considered to be mutagens in various genotoxicity studies (http://cs3-hq.oecd.org/scripts/hpv/). No testing is recommended.

4.4.4 Reproductive/Developmental Toxicity

Due to the rapid hydrolysis of the test substance into DETA and MIBK, the mammalian oral reproductive/developmental toxicity is expected to result from the hydrolysis products, DETA and MIBK. This endpoint should be referenced to reproductive/developmental toxicity on DETA and MIBK. No testing is recommended.

5. Summary

The test substance, Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) rapidly hydrolyzes (within minutes) to DETA and MIBK. Several physical chemical properties and toxicity of this substance are expected to result from the hydrolysis products. Both MIBK and DETA are included in the EPA HPV Challenge Program and these chemicals are being handled under the Organization for Economic Cooperation and Development (OECD) HPV Screening Information Data Set (SIDS) Program. Therefore, data contained in the dossiers prepared for DETA and MIBK for the OECD SIDS program (http://cs3-hq.oecd.org/scripts/hpv/) should be utilized to fill data gaps for Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene).

6. References

(1) Springborn Smithers Laboratories. Report 511.6215, Dated 10-29-02.

(2) PPG Industries Analytical Report No. CR10040, Dated 9-18-02.

(3) Carnegie-Mellon Institute of Research report No. 81-21S, Dated 3-13-81.

201-14300B

Robust Summaries for

Diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene)

CAS No. 10595-60-5

Existing Chemical ID:	10595-60-5
CAS No.	10595-60-5
Producer Related Part	
Company:	PPG Industries, Inc.
Creation date:	01-NOV-2002
Substance Related Part	
Company:	PPG Industries, Inc.
Creation date:	01-NOV-2002
Printing date:	12-DEC-2002
Revision date:	
Date of last Update:	**06-DEC-2002**
Number of Pages:	**9**
Chapter (profile):	Chapter: 2.1, 2.2, 2.4, 2.5, 2.6.1, 3.1.1, 3.1.2, 3.3.1, 3.5, 4.1, 4.2, 4.3, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.4, 5.5, 5.6, 5.8.1, 5.8.2
Reliability (profile):	Reliability: without reliability, 1, 2, 3, 4
Flags (profile):	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

2. Physico-chemical Data

2.1 Melting Point

-

2.2 Boiling Point

-

2.4 Vapour Pressure

Value: = .00035 hPa at 25 degree C

Method: other (calculated)
Year: 2002
GLP: no

Remark: The vapor pressure was estimated using the EPIWIN/MPBPWIN Program. The calculation used a boiling point of 321.28 degree C that was calculated by the same model. The vapor pressure calculation was done by the modified Grain method.
Reliability: (2) valid with restrictions
Data were obtained by modeling.

2.5 Partition Coefficient

Partition Coeff.: octanol-water
log Pow: = 7.63

Method: other (calculated)
Year: 2002
GLP: no

Remark: The Log Kow was calculated using the EPIWIN/WSKow program.
Reliability: (2) valid with restrictions
Data were obtained by modeling.

2.6.1 Solubility in different media

-

3.1.1 Photodegradation

Type:	air
Light source:	other
DIRECT PHOTOLYSIS	
Halflife t1/2:	= .1 day(s)
Method:	other (calculated)
Year:	2002
GLP:	no
Method:	The half-life is calculated using the EPIWIN/AOPWIN Program. The hydroxyl radical rate constant was calculated to be 95.2679 E-12 cm3/molecule-sec.
Reliability:	(2) valid with restrictions Data were obtained by modeling.

3.1.2 Stability in Water

Type:	abiotic
t1/2 pH4:	= 34.5 minute(s) at 20 degree C
t1/2 pH7:	= 3.6 minute(s) at 20 degree C
t1/2 pH9:	= 1.3 minute(s) at 20 degree C
t1/2 pH 1.2 :	= 28.9 minute(s) at 20 degree C
Deg. products:	yes 108-10-1 203-550-1 4-methylpentan-2-one 111-40-0 203-865-4 2,2'-iminodi(ethylamine)
Method:	OECD Guide-line 111 "Hydrolysis as a Function of pH"
Year:	2002
GLP:	yes
Test substance:	other TS
Result:	The temperature of the test solutions was maintained at approximately 20 degree C during hydrolysis testing. The pH of the test solutions was relatively unchanged. The test substance hydrolyzed rapidly in natural water bodies. In addition, the presence of the degradate DETA was confirmed during each of the tests.
Test condition:	Hydrolysis testing was performed at approximately 2450 mg/L at pH 1.2 and 4 and approximately 250 mg/L at pH 7 and 9. Samples were collected at four to six intervals, depending on pH, to monitor a fast hydrolysis rate. At each interval, the concentration of the test substance and the presence of the degradate diethylenetriamine (DETA, CAS number 111-40-0) in solution was determined by liquid chromatography/mass spectrometry (LC/MS).
Test substance:	The test substance used was 70% diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) in methylisobutylketone (MIBK). The reference substance used was Diethylenetriamine (DETA, CAS number 111-40-0).

3. Environmental Fate and Pathways

Reliability: (1) valid without restriction

Reference: (1)

Type: abiotic
t1/2 pH4: < 5 minute(s) at 20 degree C
t1/2 pH7: < 5 minute(s) at 20 degree C
t1/2 pH9: < 5 minute(s) at 20 degree C
t1/2 pH 1 : < 5 minute(s) at 20 degree C
Deg. products: yes
108-10-1 203-550-1 4-methylpentan-2-one
111-40-0 203-865-4 2,2'-iminodi(ethylamine)

Method: OECD Guide-line 111 "Hydrolysis as a Function of pH"
Year: 2002
GLP: no
Test substance: other TS

Result: Over 90 % of the test substance hydrolyzed within 5 minutes. The test substance was almost completely hydrolyzed within one hour period. The presence of the degradate DETA was also confirmed.
Test condition: Hydrolysis testing was performed with test substance in 0.01 molar at pH 1, 4, 7, and 9. Samples were collected at the very beginning of the reaction and at several successive intervals. At each interval, the concentration of the test substance and the presence of the degradate diethylenetriamine (DETA, CAS number 111-40-0) in solution was determined by mass spectrometry (MS).
Test substance: The test substance used was 70% diethylenetriamine, 1,7-bis(1,3-dimethylbutylidene) in methylisobutylketone (MIBK). The reference substance used was Diethylenetriamine (DETA, CAS number 111-40-0).
Reliability: (2) valid with restrictions
The test was not conducted in compliance with GLP.

Reference: (2)

3.3.1 Transport between Environmental Compartments

Type: fugacity model level III
Media: water - air
Method: other
Year: 2002
Air: .078 **% (Fugacity Model Level I)**
Water: 3.59 **% (Fugacity Model Level I)**
Soil: 27.3 **% (Fugacity Model Level I)**

Method: The EPIWIN Program was used to conduct Level III fugacity modeling. A mass amount of 69% is estimated for sediment using the same model.
Reliability: (2) valid with restrictions
Data were obtained by modeling.

3. Environmental Fate and Pathways

3.5 Biodegradation

-

4. Ecotoxicity

AQUATIC ORGANISMS

4.1 Acute/Prolonged Toxicity to Fish

-

4.2 Acute Toxicity to Aquatic Invertebrates

-

4.3 Toxicity to Aquatic Plants e.g. Algae

-

5. Toxicity

5.1 Acute Toxicity

5.1.1 Acute Oral Toxicity

Type:	LD50
Species:	rat
Strain:	other
Sex:	male/female
No. of Animals:	30
Doses:	1.0, 2.0, 4.0 ml/kg
Value:	= 1.9 ml/kg bw
Method:	other
Year:	1981
GLP:	no
Test substance:	as prescribed in the test plan
Method:	Standard FHSA procedures was followed.
Result:	All animals dosed at 4.0 ml/kg died within one day of dosing. Six animals died from one to nine days after dosing in the 2.0 ml/kg group. No animals treated with 1 ml/kg died. The LD50 was 2.13 ml/kg for males, 1.64 ml/kg for females, and 1.88 ml/kg for both sexes.
Test condition:	Groups of five male and five female fasted Albino rats were dosed with the undiluted sample at dosage levels of 4, 2, and 1 ml/kg. Animals were observed for signs of toxicity and mortality. Weight changes were measured in 14 day study period. Necropsies were performed on all animals upon death or 14 days after dosing.
Reliability:	(2) valid with restrictions The test was not conducted in compliance with GLP. The study is comparable to a Guideline study and is acceptable for assessment.

Reference: (3)

5.1.2 Acute Inhalation Toxicity

-

5.1.3 Acute Dermal Toxicity

Type:	LD50
Species:	rabbit
Strain:	New Zealand white
Sex:	male/female
No. of Animals:	4
Doses:	2.0 ml/kg
Value:	> 2 ml/kg bw
Method:	other
Year:	1981
GLP:	no
Test substance:	as prescribed in the test plan

5. Toxicity

Method:	Modified Interagency Regulatory Liason Group Guidelines for Selected Acute Toxicity Test.
Result:	No animals died during the 14 day test period. Severe erythema, severe eschar, and necrosis were noted. The LD50 was greater than 2 ml/kg body weight.
Test condition:	Dorsal area (240 cm2) of two males and two females was abraded and dosed under porous gauze dressing covered by a semi-occlusive wrapping of polyethylene sheetings. Rabbits were restrained in a hood for 24-hour contact period.
Reliability:	(2) valid with restrictions The test was not conducted in compliance with GLP.

Reference: (3)

5.1.4 Acute Toxicity, other Routes

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5.4 Repeated Dose Toxicity

-

5.5 Genetic Toxicity 'in Vitro'

-

5.6 Genetic Toxicity 'in Vivo'

-

5.8.1 Toxicity to Fertility

-

5.8.2 Developmental Toxicity/Teratogenicity

-

9. References

(1) Springborn Smithers Laboratories. Report 511.6215, Dated 10-29-02.

(2) PPG Industries Analytical Report No. CR10040, Dated 9-18-02.

(3) Carnegie-Mellon Institute of Research Report No. 81-21S, Dated 3-13-81.